EVALUATION REPORT FOR PERMIT TO CONSTRUCT/OPERATE

Applicant's Name: LIFOAM INDUSTRIES, LLC Facility ID: 144455

Mailing Address: 2340 E 52ND STREET
VERNON, CA 90058

Equipment Location: SAME

EQUIPMENT DESCRIPTION

Modifications are shown in bold italic, original in bold strike-though.

Appl. No. 508347 – Change of Condition (E73.1)

Equipment	ID No.	Connected to	RECLAIM Source Type/ Monitoring Unit	Emission and Requirements	Conditions
Process 2: AIR POLLUTION CONTROL					
System 1: AIR POLLUTION CONTROL SYSTEM					
OXIDIZER, ***THERMAL REGENERATIVE,*** SHIP & SHORE ENVIRONMENTAL INC., NATURAL GAS, WITH ***A PRE-FILTRATION CHAMBER,*** A 50 HP MAIN ~~**BLOWER**~~ AND A 5 HP COMBUSTION AIR BLOWER***S***, WITH LOW NOX BURNER, 3 MMBTU/HR WITH A/N: ~~**502727**~~ ***508347*** BURNER, NATURAL GAS, MAXON, LO-NOX BURNER, 3 MMBTU/HR BLOWER, BOOSTER, 2 TOTAL, EACH 2 HP, VENTING PRE-EXPANDER NOS. 1 AND 2 BLOWER, BOOSTER, 5 HP, VENTING STORAGE SILO NOS. 10 THROUGH 44 BLOWER, BOOSTER, 1 HP, VENTING STORAGE SILO NOS. 1 THROUGH 9	C109	D3 D6 D13 D14 D16 D17 D18 D19 D20 D21 D22 D23 D24 D25 D26 D27 D28 D29 D30 D31 D32 D33 D34 D35 D36 D37 D38 D39 D48 D52 D58 D62 D70 D72 D87 D89 D91 D93 D96 D112 D114 D116 D118 D120 D122 C125 D137 D138 D139 D140 D141 D142 D143 D144 D145 D146 D147 D148 D149 D150 D151 D152 D153 D154 D155 D158	NOX: PROCESS UNIT**	**CO:** 2000 PPMV NATURAL GAS (5) **[RULE 407, 4-2-1982]**; **NOX**: 130 LBS/MMCF NATURAL GAS (1) **[RULE 2012, 5-6-2005]; PM10:** 0.1 GRAINS/SCF NATURAL GAS (5A)**[RULE 409, 8-7-1981]**; **VOC:** (9) **[RULE1175, 5-13-1994**; RULE 1175, 9-7-2007]	D29.4, E73.1, ***E73.2,*** E193.1, E193.3, ***K67.2, K67.3***

ENCLOSURE, POLYSTYRENE BEAD PRE-EXPANSION, 3 FLOOR SWEEPS, 250 CFM EACH A/N: ~~502727~~ *508347*	D125	D2 D3 D5 D6 D40 D97 D98 D99 D100 D101 D102 C109		**PM:** (9) **[RULE 405, 2-7-1986];** **VOC:** (9) **[RULE1175, 5-13-1994**; RULE 1175, 9-7-2007]	D12.3, D29.4, D323.1

Appl. No. 508346 – Minor Title V Facility Permit Revision

Revision of Title V Facility Permit per Rule 301(l)(7).

PERMIT CONDITIONS

The following Permit Conditions are changed and/or added:

E73.1 Notwithstanding the requirements of section E conditions, the operator is not required to use the RTO to control emissions from ~~**aging**~~ ***storage*** silos during the ~~**RTO**~~ ***pre-filtration chamber*** maintenance period:

~~**The RTO maintenances (consisting of filter replacement and filter chamber clean-up) period shall not exceed one hour per week and shall only be performed when the pre-expanders and molding equipment have been shut down for at least 72 hours.**~~

The maintenance period shall not exceed one hour per week and shall be performed after the pre-expanders have been shut down for at least 72 hours.

The molding equipment shall not be in operation during any maintenance period.

The exhaust booster blowers venting ~~**aging**~~ ***storage*** silo ***nos. 1 through 44*** shall not be in operation during ~~**RTO**~~ ***any*** maintenance period.

The operator shall maintain at least one set of replacement filters on site.

Materials collected from the filters and the ~~**filter**~~ ***pre-filtration*** chamber shall be discharged only into enclosed containers or returned to process and shall not be handled in a manner that may result in the re-release of collected materials to the atmosphere.

~~**The operator shall maintain records in a manner approved by the District, to demonstrate compliance with this condition.**~~

To comply with this condition, the operator shall keep records as specified in condition number K67.2.

[RULE 1175, 5-13-1994; Rule 1175, 9-7-2007; **RULE 1303(a)(1)-BACT, 5-10-1996;** RULE 1303(a)(1)-BACT, 12-6-2002**]**

[Devices subject to this condition: C109]

E73.2 Notwithstanding the requirements of section E conditions, the operator is not required to use the RTO to control emissions from storage silos during the RTO maintenance period:

The maintenance period shall not exceed 33 hours per maintenance and 4 maintenances per calendar year. The maintenance shall be performed after the pre-expanders have been shut down for at least 68 hours, and the weighted average aging time of the pre-puff beads shall be at least 80 hours.

To demonstrate the compliance with this condition, the weighted average aging time shall be defined as Sum of (Wi x ti) / Sum of Wi, where Wi is the total weight of pre-puff beads in an individual storage silo, and ti is the aging time of the pre-puff beads in an individual storage silo at beginning of the maintenance activity.

The molding equipment shall not be in operation during any maintenance period.

The exhaust booster blowers venting storage silo nos. 1 through 44 shall not be in operation during any maintenance period.

To comply with this condition, the operator shall keep records as specified in condition number K67.3.

[RULE 1175, 5-13-1994; Rule 1175, 9-7-2007; **RULE 1303(a)(1)-BACT, 5-10-1996;** RULE 1303(a)(1)-BACT, 12-6-2002**]**

[Devices subject to this condition: C109]

K67.2 ***The operator shall keep records, in a manner approved by the District, for the following parameter(s) or item(s):***

The date and time at beginning of the RTO pre-filtration chamber maintenance

The date and time at end of the RTO pre-filtration chamber maintenance

The total hours since the pre-expander operation has been stopped prior to the RTO pre-filtration chamber maintenance

All records required by this condition shall be retained on the premises for at least five calendar years, and shall be made available to the Executive Officer or representative upon request.

[RULE 1175, 5-13-1994; Rule 1175, 9-7-2007; **RULE 1303(a)(1)-BACT, 5-10-1996;** RULE 1303(a)(1)-BACT, 12-6-2002**]**

[Devices subject to this condition: C109]

K67.3 ***The operator shall keep records, in a manner approved by the District, for the following parameter(s) or item(s):***

The date and time at beginning of the RTO maintenance

The date and time at end of the RTO maintenance

The total hours since the pre-expander operation has been stopped prior to the RTO maintenance

The total hours since the molding operation has been stopped prior to the RTO maintenance

The total weight of pre-puff beads in each storage silo at beginning of the RTO maintenance

The total hours of pre-puff beads aged in each storage silo prior to the RTO maintenance

All records required by this condition shall be retained on the premises for at least five calendar years, and shall be made available to the Executive Officer or representative upon request.

[RULE 1175, 5-13-1994; Rule 1175, 9-7-2007; **RULE 1303(a)(1)-BACT, 5-10-1996;** RULE 1303(a)(1)-BACT, 12-6-2002**]**

[Devices subject to this condition: C109]

BACKGROUND

Lifoam Industries, LLC (Lifoam) is located in Vernon, California. Lifoam is a manufacturer of expanded polystyrene (EPS) foam products, such as picnic coolers, food containers, packaging material, and various custom molded products. Lifoam currently operates one polystyrene foam expansion/molding system and two boilers. The polystyrene foam expansion/molding system consists of three pre-expanders, 44 aging silos, 18 shape molding presses, and associated conveyors and hoppers. The VOC emissions from the polystyrene foam expansion/molding system are controlled by a regenerative thermal oxidizer (RTO).

The facility is a NOx RECLAIM and Title V facility.

Lifoam is an EPS shape molder. By nature, the EPS shape molding process generates continuous VOC emissions; and currently, the Lifoam's VOC emissions are continuously controlled by the RTO, except for one hour per week, to replace a filter located at the RTO inlet. Any break-down of the RTO may lead to catastrophic emissions and tremendous business loss due to unexpected disruption of the manufacturing activity. To avoid such catastrophe, Lifoam proposes to revise their Title V facility permit, to be allowed performing regular preventative maintenances on the RTO. Such maintenance activities will be performed when the uncontrolled emissions are minimal. On February 26, 2010, Lifoam submitted two applications indicated as follows:

Appl. No.	Type	Previous Permit No.	Equipment
508346	Plan	N/A	Title V / RECLAIM Permit Revision
508347	Change-of-Condition	G6645	Regenerative Thermal Oxidizer (C109)

Appl. No. 508347 is submitted as an expedited class-I change-of-condition application to allow the RTO (C109) be shut down for the annual maintenances as recommended by the RTO manufacturer. Lifoam proposes to conduct four maintenance events per year, and each event will not exceed 33 hours. The 33 hours include a 24-hour cool-down period, and eight hours for inside RTO maintenance work and one hour to warm-up RTO combustion chamber. To minimize the uncontrolled emissions, Lifoam also proposed the following:

- Shutdown of the RTO will be at least 68 hours after the shutdown of the pre-expanders.
- The weighted average time the pre-puff beads are in storage silos at the beginning of the RTO shutdown will be no less than 80 hours.

Lifoam did not propose to increase their throughput, and the manufacturing and post-manufacturing VOC emissions are restricted by Rule 1175(c)(2) to 2.4 lbs per 100 lbs raw materials; thus, the proposed change of conditions will not trigger the NSR rules, but the compliance with Rule 1175(c)(2) has to be evaluated.

Appl. No. 508346 is submitted as a plan for the minor revision of the Title V/Reclaim permit as specified in Rule 301.

PROCESS DESCRIPTION

There are no physical modifications to the manufacturing process. For detail process description, please refer to engineer evaluation under application no. 502726.

This facility operates 24 hrs/day, 7 days/wk, and 52 wks/yr.

Rule 1175 Compliance

Lifoam had two source tests performed on their EPS foam plant on April 16 and July 2, 2008. The test results were consolidated as one report dated on September 30, 2008, and the report was approved by the District M&STE on October 31, 2008 (ref. 08075). These tests have demonstrated the plant is currently operating in compliance with Rule 1175.

EMISSION CALCULATIONS

Lifoam will continue to meet with the current throughput limit under condition F1.1 (270 tons/month). In addition, Lifoam chooses to comply with 1175(c)(2); thus, the emission factor of 2.4 lb VOC emission per 100 lb raw material will continue to be used for the NSR calculations. Therefore, if the proposed condition change is not affecting the facility compliance status with Rule 1175(c)(2), this project is considered no emission increase.

Source Test Data:
Lifoam submitted source test data that was obtained during a source test performed in April 2008. The test results contain relevant information indicated as follows:

Method 306 Results

FHR 6655 Bead	Pentane Contents (w/w %)	lb Pentane/100 lb Polystyrene
Raw Bead:	5.82%	6.18
Pre-puff 0-hr:	4.68%	4.91
Pre-puff 24-hr:	2.18%	2.23
Pre-puff 48-hr:	1.61%	1.64
Product:	1.48%	1.50

Other Data:
Maximum pre-puff storage capacity = 34,700 lbs and 22,160 ft^3
Storage exhaust collection flow = 2,700 cfm
RTO Collection Efficiency = 94.7% (Source test on April 16, 2008)
RTO Destruction Efficiency = 97.2% (Source test on July 2, 2008)

EPS Pre-expanding Process

C5 collected and destroyed = (6.18 lbs – 4.91 lbs) (94.7%) (97.2%) = 1.17 lbs

EPS Pre-puff Aging Process

C5 collected and destroyed = (4.91 lbs – 1.64 lbs) (94.7%) (97.2%) = 3.01 lbs

Uncontrolled pentane off-gassing due to scheduled maintenance of RTO

The pentane off-gassing rate at bead aging area is assumed to be direct proportion to the bead concentration at time. Therefore, assume:

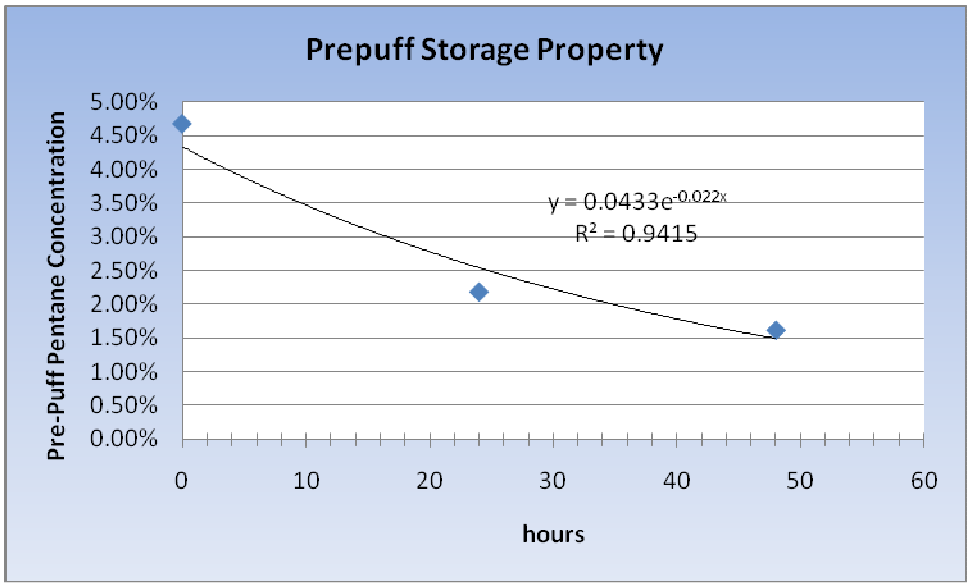
$$\frac{dC}{dt} = kC$$

Where: C = Pentane Concentration
t = time
k = constant

Then: $\int dt = k\int \frac{dC}{C}$ or $t = k\ln C + Constent$

or $C = k_1 \exp(k_2 t)$

Insert the source test data listed above, and then the following relationship in the bead aging process is obtained:



$C = 0.0433\, e^{(-0.022\, t)}$ with $R^2 = 0.9415$

One hour per week maintenance pentane off-gassing:

Based on the equation, the weekly one-hour pentane off-gassing is calculated as:

Pre-puff hours	Pentane Contents	Lb C5 / 100 Polystyrene
72	0.888%	0.896
73	0.869%	0.877
Total uncontrolled emissions from 72 to 73 hours =		**0.020**

33 hours per quarter maintenance pentane off-gassing:

The pre-puff pentane concentration at weight average time is calculated using the following equation:

$$C_{weight-avg} = \frac{\int_{t_{min}}^{2t_{weight-avg}-t_{min}} 0.0433e^{-0.022t}}{2t_{weight-avg} - 2t_{min}}$$

Where:

$T_{weight-avg}$ = weighted average time the pre-puff beads are in storage silos at the beginning of the RTO shutdown, 80 hours

T_{min} = Minimum shutdown time of the pre-expanders before the shutdown of the RTO, 64 hours

Based on this equation, the 33-hour pentane off-gassing is calculated as:

Pre-puff hours	Pentane Contents	Lb C5 / 100 Polystyrene
t_{min} = 68	0.754%	0.759
$t_{wight-avg}$ = 80		
t_{min} + 33 hours = 101	0.365%	0.366
$t_{wight-avg}$ + 33 hours = 113		
Total uncontrolled emissions 33 hours =		**0.393**

EPS Shape Molding Process

C5 collected and destructed = (1.64 lbs – 1.50 lbs) (94.7%) (97.2%) = 0.13 lbs

Rule 1175 Compliance Determination

$$\frac{6.18 \text{ lbs} - 1.17 \text{ lbs} - (3.01 \text{ lbs} - 0.393 \text{ lbs}) - 0.13 \text{ lbs}}{6.18 \text{ lbs} + 100 \text{ lbs}} \times 100 \text{ lbs} = 2.13 \text{ lbs} / 100 \text{ lbs}$$ **(Compliance!)**

VOC Emission Summary:

Operation: 24 hrs/day, 7 days/wk, and 52 wks/yr

Production (Max.): 270 tons/month (Condition No. F1.1), or 9 tons/day, or 750 lb/hr

Raw Material Blowing Agent Content (Max.): 6.1 % by weight (Condition No. B163.1)

Rule 1175(c)(2) limits 2.4 lb VOC emissions / 100 lb raw material processed.

Therefore, the calculated controlled and uncontrolled VOC PTE's are indicated as follows:

R1 = (750 lb/hr) (6.1%) = **45.75 lb/hr or 1,098 lb/day**
R2 = (750 lb/hr) (2.4 lb VOC / 100 lb Raw Materials) = **18 lb/hr or 432 lb/day**

Appl. No. 508347 - RTO (C109) Combustion Emission Calculation:

Emission Factors

$$\text{Emission}_{\mathbf{ROG,SOX,PM10}}\,(\text{lb/MMBtu}) = EF_{ROG,SOX,PM10}\left(\frac{lb}{MMscf}\right) x \frac{1MMscf}{1050MMBtu}$$

Emission Factor Summary - Natural Gas

Pollutant	Emission Factor (AQMD Default) lb/mmscf	Emission Factor (for this report) lb/MMBtu
VOC	7	0.00667
SOx	0.6	0.000571
PM10	7.5	0.00714
NOx	Not Applicable - Will be monitored under the RECLAIM Program	
CO	35	0.03333

AQMD Default emission factors for a natural gas fired boiler were taken from "General Instruction Book for the AQMD 2005-2006 Annual Emission Reporting Program", Appendix A- Table 1):

Burner rating: 3 MMBTU/hr
Operating Schedule: 24 hrs/day; 7 days/week; 52 weeks/yr

The calculated emission results are indicated below:

Appl. No. 508347 - RTO (C109) Combustion Emission Summary

		Hourly (lbs/hr)	Daily (lbs/day)	Annually (lbs/yr)	30 day ave. (lbs/day)	30 day NSR (lbs/day)
R1=R2	**VOC**	0.020	0.48	174.8	0.48	0
R1=R2	**SOx**	0.002	0.04	15.0	0.04	0
R1=R2	**PM10**	0.021	0.51	187.1	0.51	1
R1=R2	**CO**	0.100	2.40	873.5	2.40	2

RULES AND REGULATIONS EVALUATION

Rule 212: **Standards for Approving Permits** – The facility is not located within 1,000 feet of a K-12 school, and there is no emission potential increase with this change of condition application. A Public Notice is not required.

Rule 401: **Visible Emissions** – Compliance is expected from well maintained and properly operated equipment.

Rule 402: **Public Nuisance** – With proper operation and maintenance, the equipment is not likely to create a public nuisance.

Rule 1147: **NOx Reductions from Miscellaneous Sources**

The RTO is a "Process Unit" under RECLAIM program and it is exempted from this rule under (g)(1)(B).

Rule 1175: **Control of Emissions from the Manufacture of Polymeric Cellular (Foam) Products**

Lifoam had two source tests performed on their EPS foam plant on April 16 and July 2, 2008. The test results indicated the plant is operating in compliance with Rule 1175.

In addition, based on the calculations of this report, the increase of the VOC due to proposed change of conditions is still within the (c)(2) limit. Therefore, compliance with this rule is expected.

REG XIII: **New Source Review** - There are no emission potential increases associated with the proposed change of conditions. No emission offset is required for this application.

Rule 1401: There is no toxic air contaminant associated with these applications. Risk assessment is not required.

RULE 2005: **New Source Review for RECLAIM**

NOx emissions will not increase due to the proposed change of conditions. No emission offset is required.

Reg XXX: **Title V Permit**

Lifoam (Facility ID: 144455) has an active Title V permit. Based on the above evaluation, no PTE increase is expected for the proposed change of conditions. Therefore, application no. 508347 is considered Minor Permit Revision of Title V Facility Permit and it is subject to a 45-day EPA review prior to final revision of the Title V Facility Permit (Application No. 508346).

CONCLUSION AND RECOMMENDATIONS

Based on this evaluation, it is expected that the subject equipment will be operated in compliance with all applicable District Rules and Regulations. The Permit to Construct/Operate is recommended to be issued.